IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT :Yoshikazu Oochi
APPLICATION No. : 09/357,220
FILING DATE : July 20, 1999
TITLE : VIDEO CAMERA APPARATUS

Group Art Unit : 2615
Examiner : Nhan T. Tran

Hon. Commissioner of Patents and Trademarks,
Washington, D.C. 20231

SIR:

CERTIFIED TRANSLATION

I, Tatsuhiro Mochizuki, am an official translator of the Japanese language into the English language and I hereby certify that the attached comprises an accurate translation into English of Japanese Application No. 10-206953, filed on July 22, 1998.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

May 23, 2006
Date

Tatsuhiro Mochizuki
Tatsuhiro Mochizuki

[Document Name] Patent Application

[Reference Number] 9800668904

[Filing Date] July 22, 1998

[To] Hon.Commissioner, Patent Office

[IPC] H04N 5/225

[Title of the Invention] Image Pick-Up Apparatus and Image Pick-Up Method

[Number of Claims] 4

[Inventor]

[Address] c/o Sony Corporation

7-35, Kitashinagawa 6-chome, Shinagawa-ku, Tokyo, Japan

[Name] Yoshikazu Oochi

[Patent Applicant]

[Identification Number] 000002185

[Name] Sony Corporation

[Representative] Nobuyuki Idei

[Patent Attorney]

[Identification Number] 100067736

[Patent Attorney]

[Name] Akira Koike

[Patent Attorney]

[Identification Number] 100086335

[Patent Attorney]

[Name] Eiichi Tamura

[Patent Attorney]

[Identification Number] 100096677

[Patent Attorney]

[Name] Seiji Iga

[Indication of Charge]

[Number of Prepaid Ledger] 019530

[Amount] 21,000 yen

[List of Document]

[Document]	Specification	1
[Document]	Drawing	1
[Document]	Summary	1

[General Power of Attorney Number] 9707387

[Need of Proof] Yes

[Name of Document] SPECIFICATION

[Title of the Invention]

Image Pick-Up Apparatus and Image Pick-Up Method

[CLAIMS]

1 An image pick-up apparatus comprising:

a solid-state image sensor having electronic shutter function, and capable of outputting an image pick-up signal in all pixel read-out mode; and

drive control means for controlling the electronic shutter function of the solid-state image sensor by shutter pulses in which field period in the standard television system is caused to be fundamental to allow the solid-state image sensor to output an image pick-up signal therefrom in the all pixel read-out mode.

2 An image pick-up apparatus comprising:

a solid-state image sensor having electronic shutter function, and serving to perform switching operation of the operation mode between interlaced read-out mode and all pixel read-out mode to have ability to output an image pick-up signal; and

drive control means for performing a control to switch the operation mode of the solid-state image sensor, and for controlling, in the all pixel read-out mode, the electronic shutter function of the solid-state image sensor in conformity with a shutter speed in the interlaced read-out mode to allow the

solid-state image sensor to output an image pick-up signal therefrom in the all pixel read-out mode.

3 An image pick-up method comprising steps of:

controlling electronic shutter function of a solid-state image sensor capable of outputting an image pick-up signal in all pixel read-out mode by shutter pulses in which field period in the standard television system is caused to be fundamental; and

allowing the solid-state image sensor to output the image pick-up signal therefrom in the all pixel read-out mode.

4 An image pick-up method comprising steps of:

controlling, in all pixel read-out mode, electronic shutter function of a solid-state image sensor adapted for performing switching operation of the operation mode between interlaced read-out mode and the all pixel read-out mode to have ability to output an image pick-up signal in conformity with a shutter speed in the interlaced read-out mode; and

allowing the solid-state image sensor to output the image pick-up signal therefrom in the all pixel read-out mode.

[Detailed Description of the Invention]

[0001]

[Field of the invention]

The present invention relates to an image pick-up apparatus and an

image pick-up method which are adapted for performing image pick-up operation by making use of electronic shutter function by a solid-state image sensor capable of outputting an image pick-up signal in the all (full) pixel read-out mode.

[0002]

[Prior Art]

Hitherto, image pick-up apparatuses in conformity with the standard television system such as NTSC (National Television Systems Committee) system or PAL (Phase Alternation by Line) system, etc. are adapted to obtain an image pick-up signal which has been caused to undergo interlaced read-out operation from an image pick-up unit to output the image pick-up signal as a video signal of a predetermined standard television system. Further, in a video cassette recorder (VCR) or a video tape recorder (VTR) integrated with a camera, which is the so-called camcorder, image pick-up operation synchronous with a vertical synchronizing signal VD is performed by solid-state image sensor as shown in FIG. 11 thus to handle moving image by a video signal of a predetermined standard television system which has been generated from interlaced image pick-up signal obtained by reading out image pick-up charges every one field with one field period being as charge storage period. Moreover, in the camcorder, in the case of handling a still image, since image of one frame is constituted by 2 (two) fields in an image signal which

has been caused to undergo interlaced read-out operation, a shift in terms of time between fields would result in deterioration of picture quality. Accordingly, an interlaced signal is converted into a progressive scan signal to perform recording/reproduction of still picture.

[0003]

On the contrary, in electronic still cameras dedicated for still pictures (images), a still image pick-up signal of high picture quality is obtained by all (full) pixel read-out operation from a solid-state image sensor which complies with the progressive scanning system to perform recording onto recording medium.

[0004]

[Problems to be solved by the invention]

Meanwhile, in solid-state image sensors which comply with the progressive scanning system, a still image pick-up signal of high picture quality can be obtained by all (full) pixel read-out operation. However, as shown in FIG. 12, since charge storage is performed in one frame period, in the case where an image of a moving object is picked up, there results blurred image, leading to the problem that there does not result completely still image as still picture.

[0005]

In view of the above, an object of the present invention is to provide

an image pick-up apparatus and an image pick-up method which are capable of obtaining a still picture (image) having no blurring even when an image of a moving object is picked up by using a solid-state image sensor which complies with the progressive scanning system.

[0006]

[Means for solving the problems]

To solve the above-described problems, the image pick-up apparatus according to the present invention comprises: a solid-state image sensor having electronic shutter function, and capable of outputting an image pick-up signal in all pixel read-out mode; and drive control means for controlling the electronic shutter function of the solid-state image sensor by shutter pulses in which field period in the standard television system is caused to be fundamental to allow the solid-state image sensor to output an image pick-up signal therefrom in the all pixel read-out mode.

[0007]

Moreover, the image pick-up apparatus according to the present invention comprises: a solid-state image sensor having electronic shutter function, and serving to perform switching operation of the operation mode between interlaced read-out mode and all pixel read-out mode to have ability to output an image pick-up signal; and drive control means for performing a control to switch the operation mode of the solid-state image sensor, and for

controlling, in the all pixel read-out mode, the electronic shutter function of the solid-state image sensor in conformity with a shutter speed in the interlaced read-out mode to allow the solid-state image sensor to output an image pick-up signal therefrom in the all pixel read-out mode.

[0008]

Further, the image pick-up method according to the present invention comprises steps of: controlling electronic shutter function of a solid-state image sensor capable of outputting an image pick-up signal in all pixel read-out mode by shutter pulses in which field period in the standard television system is caused to be fundamental; and allowing the solid-state image sensor to output the image pick-up signal therefrom in the all pixel read-out mode.

[0009]

In addition, the image pick-up method according to the present invention comprises steps of: controlling, in all pixel read-out mode, electronic shutter function of a solid-state image sensor adapted for performing switching operation between interlaced read-out mode and the all pixel read-out mode to have ability to output an image pick-up signal in conformity with a shutter speed in the interlaced read-out mode; and allowing the solid-state image sensor to output the image pick-up signal therefrom in the all pixel read-out mode.

[0010]

[Best Mode for Carrying Out the Invention]

The embodiments of the present invention will now be explained in detail with reference to the attached drawings.

[0011]

For example, the present invention is applied to a camcorder 100 caused to be of the configuration as shown in FIG. 1. The camcorder 100 comprises an I/F processing·image MIX circuit 3 supplied with an image signal from an image pick-up unit 1 and/or a line-in signal processing circuit 2, a recording/reproducing unit 5 and a display unit 6 which are connected to the I/F processing·image MIX circuit 3 through a DV recording/reproduction signal processing circuit 4, an I/F processing circuit 8 connected to the I/F processing·image MIX circuit 3 through an compression/expansion circuit 7, a PCMCIA (Personal Computer Memory Card International Association) memory card detachably connected to the I/F processing circuit 8 through a PCMCIA connector 9, a control unit 11 for controlling these circuit components, and an operation block 12 connected to the control unit 11, etc.

[0012]

The image pick-up unit 1 comprises, as outline of the configuration thereof is shown in FIG. 2, a CCD image sensor 23 on which image pick-up light incident through an iris 22 from an image pick-up (imaging) lens 21 is

incident, whereby an image pick-up signal obtained as an image pick-up output by the CCD image sensor 23 is outputted through a camera signal processing circuit.

[0013]

The iris 22 is driven by an iris drive unit 27 connected to an iris drive circuit supplied with an iris control signal from a camera control microcomputer 25.

[0014]

Moreover, the CCD image sensor 23 is driven as the result of the fact that various timing signals such as a sensor gate signal and/or a transfer clock, etc. are delivered thereto from a timing signal generator 28.

[0015]

The camera signal processing circuit 24 and the timing signal generator 28 are adapted so that operation modes thereof are switched in accordance with a control signal delivered from the camera control microcomputer 25.

[0016]

The CCD image sensor 23 comprises, as its structure is shown in model form in FIG. 3, respective photo-sensors S arranged in matrix form in correspondence with pixels, vertical transfer registers VR from which image pick-up charges of respective pixels obtained by the respective photo-sensors

are read out, and a horizontal transfer register HR to which image pick-up charges of respective pixels are transferred through the vertical transfer registers VR every horizontal line, whereby image pick-up charges of respective pixels are outputted as an image pick-up signal through an output unit SO from the horizontal transfer register HR every horizontal line. The CCD image sensor 23 is directed to a CCD imager caused to be of all (full) pixel read-out type in principle, wherein there are provided vertical transfer registers VR corresponding to the number of pixels on the horizontal line, and respective vertical registers VR respectively have the number of transfer stages corresponding to the number of all pixels on the vertical line.

[0017]

Further, when all pixel read-out mode is set by a control signal delivered from the camera control microcomputer 25, the timing signal generator 28 generates a sensor gate signal SG of two fields (2V), i.e., one frame period (1F), a vertical transfer clock CKV having 1 (one) horizontal scanning period (1H), a horizontal transfer clock CKH having a frequency corresponding to the number of pixels on the horizontal line to drive the CCD image sensor 23 in the all pixel read-out mode.

[0018]

Namely, in the all pixel read-out mode, image pick-up charges of respective pixels obtained by the respective photo-sensors S of the CCD

image sensor 23 are read out to the vertical transfer registers VR by sensor gate signal SG every two fields, i.e., one frame period (1F) to transfer image pick-up charges of all pixels, which have been read out to the vertical transfer registers VR, to the horizontal transfer registers HR by one horizontal line every one horizontal scanning period (1H) to output the image pick-up charges of respective pixels as an image pick-up signal through the output unit SO every horizontal line from the horizontal transfer register HR, thereby making it possible to obtain an image pick-up signal as progressive scan signal by image pick-up charges of all pixels.

[0019]

Further, in the all pixel read-out mode, the timing signal generator 28 controls the electronic shutter function of the CCD image sensor 23 by shutter pulses in which field period in the standard television system is caused to be fundamental.

[0020]

Namely, for example, as shown in FIG. 5, the electronic shutter is set to one field period (1/60 sec.) in the NTSC system to sweep out all stored charges in the first field to perform charge storage operation in the subsequent second field. The stored charges are read out in the subsequent two fields, i.e., one frame. Namely, since read-out operation is performed by stored charges of one field, there does not result blurred image as in the case of the

interlaced scanning system. As stated above, in the all pixel read-out mode, i.e., progressive scanning system, the electronic shutter of the CCD image sensor 23 is controlled by shutter pulses in which 1/60 sec. is caused to be fundamental, thereby making it possible to photograph a fine still image.

[0021]

Moreover, as shown in FIG. 6, when the interlaced read-out mode is set by a control signal delivered from the camera control microcomputer 25, the timing signal generator 28 generates a sensor gate signal SG having 1 (one) field period (1V), vertical transfer clocks CKV successive by two in terms of time for each horizontal scanning period (1H), and a horizontal transfer clock CKH having a frequency corresponding to the number of pixels on the horizontal line, thus to drive the CCD image sensor 23 in the interlaced read-out mode.

[0022]

Namely, in the interlaced read-out mode, image pick-up charges of respective pixels obtained by the respective photo-sensors S of the CCD image sensor 23 are read out to the vertical transfer registers VR by a sensor gate signal SG for each field period (1V) to transfer the image pick-up charges of all pixels, which have been read to the vertical transfer registers VR, to the horizontal transfer register HR by two horizontal lines for each horizontal scanning period (1H) to perform additive synthesis of charges corresponding

to two pulses which are adjacent on the vertical line by the horizontal transfer register HR to thereby output, as an image pick-up image signal, through the output unit SO every horizontal line from the horizontal transfer register HR, image pick-up charges of respective pixels in which the number of horizontal lines are reduced to one half, thereby making it possible to obtain an image pick-up signal as interlaced signal from image pick-up charges of all pixels. It is to be noted that the combination of charges corresponding to two pixels adjacent on the vertical line which are caused to undergo additive synthesis at the horizontal transfer register HR in the odd field and the combination in the even field are caused to be different from each other.

[0023]

Further, in this camcorder 100, the I/F processing·image MIX circuit 3 performs interface processing with respect to signals inputted from the image pick-up unit 1 and the line-in signal processing circuit 2, and also performs mixing of respective signals. Moreover, the DV recording/reproducing signal processing circuit 4 performs signal processing relating to recording/reproduction with respect to information signals of the so-called digital video (DV) standard. Further, the recording/reproducing unit 5 records information signals from the DV recording/reproducing signal processing circuit 4 onto a recording medium. In addition, the recording/reproducing unit 5 reproduces information signals from the

recording medium to deliver the signals thus reproduced to the DV recording/reproducing signal processing circuit 4. As the magnetic recording medium, there is used, e.g., magnetic tape where information signals are recorded as residual magnetization onto medium such as tape.

[0024]

Moreover, the display unit 6 serves to display information signals recorded/reproduced through the DV recording/reproducing signal processing circuit 4.

[0025]

Further, the compression/expansion circuit 7 is a circuit serving to expand encoded image of still picture of the JPEG (Joint Photographic Expert Group) standard or a moving image of the Motion JPEG standard into an image signal, or to compress an image signal of still picture or moving image into an encoded image of the above-mentioned standard. This compression/expansion circuit 7 performs the above processing with respect to image signals or encoded images from the I/F processing·image MIX circuit 3 or the PCMCIA I/O/ATA I/F processing circuit 8.

[0026]

Further, the PCMCIA I/O/ATA I/F processing circuit 8 is a circuit which performs interface between JPEG/Motion JPEG compression/expansion circuit 8 and the PCMCIA memory card 10.

Moreover, the PCMCIA connector 12 is a connector of the PCMCIA standard.

[0027]

Further, in the camcorder 100, as the outer appearance perspective view of a camera body 101 is shown in FIG. 7, an electronic view finder 6A and a liquid crystal display panel 6B are provided as the display unit 6 to the camera body 101, and various setting operation buttons such as a zoom operation lever 12A, an operation mode select (switch) lever 12B, a still picture photographing button 12C, a control dial 12D, menu buttons 12E and data code buttons 12F, etc. are arranged as the operation block on the camera body 101.

[0028]

The zoom operation lever 12A serves to deliver zoom operation input data corresponding to an operation position thereof to the control unit 11. Further, the control unit 11 controls the zoom drive section of the image pick-up lens 21 of the above-described image pick-up unit 1 in accordance with the zoom operation input data.

[0029]

Moreover, as shown in FIG. 8 the operation mode select (switch) lever 12B has four switch setting positions as follows.

POSITION 1: VTR

POSITION 2: OFF

POSITION 3: CAM

POSITION 4: MEMORY

Operation input data corresponding to respective positions are delivered to the control unit 11. Moreover, the still picture photographing operation button 12C is pushed down at two steps to deliver operation input data corresponding to the push-down position of the first step and the push-down position of the second step to the control unit 11. Further, the control unit 11 controls the image pick-up unit 1, the I/F processing·image MIX circuit 3, the DV recording/reproducing signal processing circuit 4, the recording/reproducing unit 5, the compression/expansion circuit 7 and the I/F processing circuit 8, etc. which have been described above in the following manner in accordance with the operation input data.

[0030]

Namely, in the camcorder 100, the control unit 11 sets the camcorder 100 to the VTR mode when the operation mode select lever 12B is located at the position 1. In the VTR mode, the control unit 11 serves to accept an operation input of VTR operation button (not shown) to control the recording/reproducing unit 5 in accordance with the operation input. For example, when the reproduction button is operated, reproducing operation by the recording/reproducing unit 5 is started.

[0031]

Moreover, the control unit 11 places the camcorder 100 in an operation stop state when the operation mode select lever 12B is located at the position 2.

[0032]

Further, the control unit 11 sets the camcorder 100 to the camera mode when the operation mode select lever 12B is located at the position 3. In the camera mode, the control unit 11 operates the image pick-up unit 1 to allow the display unit 6, i.e., the electronic view finder 6A or the liquid crystal display panel 6B to display image by an image pick-up signal. Further, when an operation input of a start/stop button 12G is accepted in this image pick-up stand-by state, recording by the recording/reproducing unit 5 is started. When an operation input of the start/stop button 12G is accepted for a second time, the recording operation is completed to return to the image pick-up standby state.

[0033]

Further, in the camera mode, the control unit 11 accepts operation input data by push-down operation of the still picture photographing operation button 12C. In the case where operation input data by the push-down operation of the still picture photographing operation button 12C is accepted in the image pick-up stand-by state, the control unit 11 serves to capture, as still picture, an image pick-up signal obtained by the image pick-up unit 1 at

the push-down position of the first step of the still picture photographing operation button 12C to display it on the display unit 6. Further, when the still picture photographing operation button 12C is pushed down to the push-down position of the second step, the control unit 11 records the captured still picture (image) by the recording/reproducing unit 5 for a predetermined time period (7 seconds in this example). It is to be noted that sound is also recorded by the recording/reproducing unit 5 during recording. Moreover, if the still picture photographing operation button 12C is released without pushing down it to the push-down position of the second step, still picture (image) to be recorded by the recording/reproducing unit 5 can be selected again. Further, in the case where the still picture photographing operation button 12C is caused to undergo push-down operation during camera picture recording, the control unit 11 records image at that time as still picture for a predetermined time (7 sec. in this example) by the recording/reproducing unit 5 to return to the image pick-up standby state after recording is completed.

[0034]

Moreover, the control unit 11 sets the camcorder 100 to the memory mode when the operation mode select (switch) lever 12B is located at the position 4.

[0035]

In this memory mode, the control unit 11 compulsorily switches the operation mode of the image pick-up unit 1 to the all pixel read-out mode. Further, when the control unit 11 accepts operation input data by push-down operation of the still picture photographing operation button 12C in this memory mode, the control unit 11 serves to capture an image pick-up signal obtained as a progressive scan signal by the image pick-up unit 1 at the push-down position of the first step of the still picture photographing operation button 12C to display it on the display unit 6. Further, when the still picture photographing operation button 12C is pushed down to the push-down position of the second step, the control unit 11 serves to record the captured still picture into the memory card 10. It is to be noted that when push-down state of the still picture photographing button 12C is released without pushing down it to the push-down position of the second step, it is possible to select, for a second time, still picture to be recorded into the memory card.

[0036]

In this example, since image pick-up signal obtained as a progressive scan signal by the image pick-up unit 1 cannot be directly displayed by the display unit 6 which complies with interlaced signal, a progressive scan signal is converted into an interlaced signal to display it on the display unit 6. Moreover, in this camcorder 100, in the camera mode, the operation mode of the image pick-up unit 1 is switched into the all pixel read-out mode to

perform image pick-up operation to convert an image pick-up signal obtained as a progressive scan signal by the image pick-up unit 1 into an interlaced signal to record it by the recording/reproducing unit 5.

[0037]

Setting of the all pixel read-out mode in the camera mode can be executed by pushing down the menu button 12E provided on the camera body 101 in the photographic standby state to thereby display the menu picture on the display unit 6 to rotate control dial 12D to switch the "progressive" to the state of "ON" from the state of "OFF" as shown in FIGS. 9(A) and (B).

[0038]

While explanation has been given here at the image pick-up unit 1 in the camcorder 100 in connection with the case where progressive scanning of 2-field storage is performed, in the case where 3-field storage is performed as shown in FIG. 10, the electronic shutter function may be controlled by shutter pulses in which two fields (1/30 sec.) are caused to be fundamental. In addition, in place of performing control to close the iris 22 in the case where exposure quantity becomes large, the electronic shutter may be controlled from 1/60 sec. toward high speed side.

[0039]

[Effects/Advantages of the invention]

As described above, in accordance with the present invention, the

electronic shutter function of the solid-state image sensor capable of outputting an image pick-up signal in the all pixel read-out mode is controlled by shutter pulses in which the field period in the standard television system is caused to be fundamental to allow the solid-state image sensor to output an image pick-up signal therefrom in the all pixel read-out mode, thereby making it possible to obtain fine (clear) still image (picture) having no blurring even if an image of moving object is picked up.

[0040]

Accordingly, in accordance with the present invention, it is possible to provide an image pick-up apparatus and an image pick-up method such that even if an image of moving object is picked up by using solid-state image sensor which complies with the progressive scanning system, still picture having no blurring can be obtained.

[Brief Description of the Drawings]

FIG. 1 is a block diagram showing the configuration of a camcorder to which the present invention is applied.

FIG. 2 is a block diagram showing outline of the configuration of an image pick-up unit of the camcorder.

FIG. 3 is a plan view showing, in a model form, the structure of a CCD image sensor of the image pick-up unit.

FIG. 4 is a timing chart showing image pick-up operation in all pixel

read-out mode of the CCD image sensor.

FIG. 5 is a timing chart showing image pick-up operation using an electronic shutter function in the all pixel read-out mode.

FIG. 6 is a timing chart showing image pick-up operation in the interlaced read-out mode of the CCD image sensor.

FIG. 7 is a perspective view showing the outer appearance of the camcorder.

FIG. 8 is a view showing respective select (switch) positions of operation mode select (switch) lever provided at the camcorder.

FIG. 9 is a view for explaining the setting of all pixel read-out mode in the camera mode of the camcorder.

FIG. 10 is a timing chart showing image pick-up operation using an electronic shutter in the all pixel read-out mode in case where 3-field storage is performed.

FIG. 11 is a timing chart showing image pick-up operation by a solid-state image sensor which performs conventional interlaced read-out operation.

FIG. 12 is a timing chart showing image pick-up operation by a solid-state image sensor which complies with conventional progressive scanning operation.

[Explanation of referenced numbers]

1 IMAGE PICK-UP UNIT, 3 I/F PROCESSING· IMAGE MIX CIRCUIT, 4 DV RECORDING/REPRODUCTION SIGNAL PROCESSING CIRCUIT, 5 RECORDING/REPRODUCING UNIT, 6 DISPLAY UNIT, 7 COMPRESSION/EXPANSION PROCESSING CIRCUIT, 8 PCMCIA I/O /ATA I/F PROCESSING CIRCUIT, 9 PCMCIA CONNECTOR, 10 PCMCIA MEMORY CARD, 11 CONTROL UNIT, 12 OPERATION BLOCK

[Name of Document] ABSTRACT

[Summary]

[Task]

To provide an image pick-up apparatus and an image pick-up method such that even if an image of a moving object is picked up by using a solid-state image sensor which complies with the progress scanning system, still image having no blurring can be obtained.

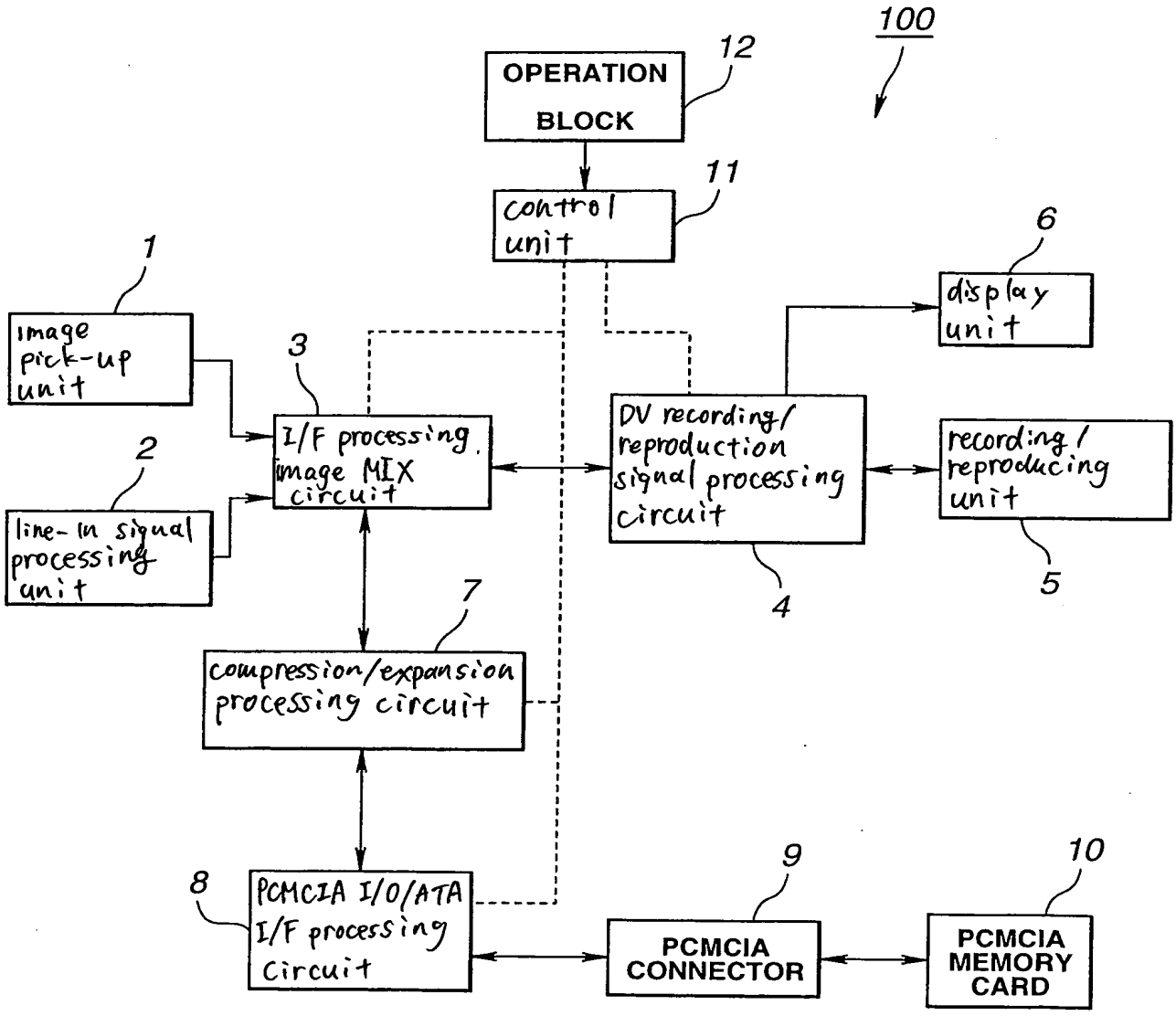
[Means for solution]

The electronic shutter function of a CCD image sensor 23 capable of outputting an image pick-up signal in the all pixel read-out mode is controlled by a timing signal generator 28 in accordance with shutter pulses in which the field period in the standard television system is caused to be fundamental to allow the CCD image sensor 23 to output an image pick-up signal therefrom in the all pixel read-out mode.

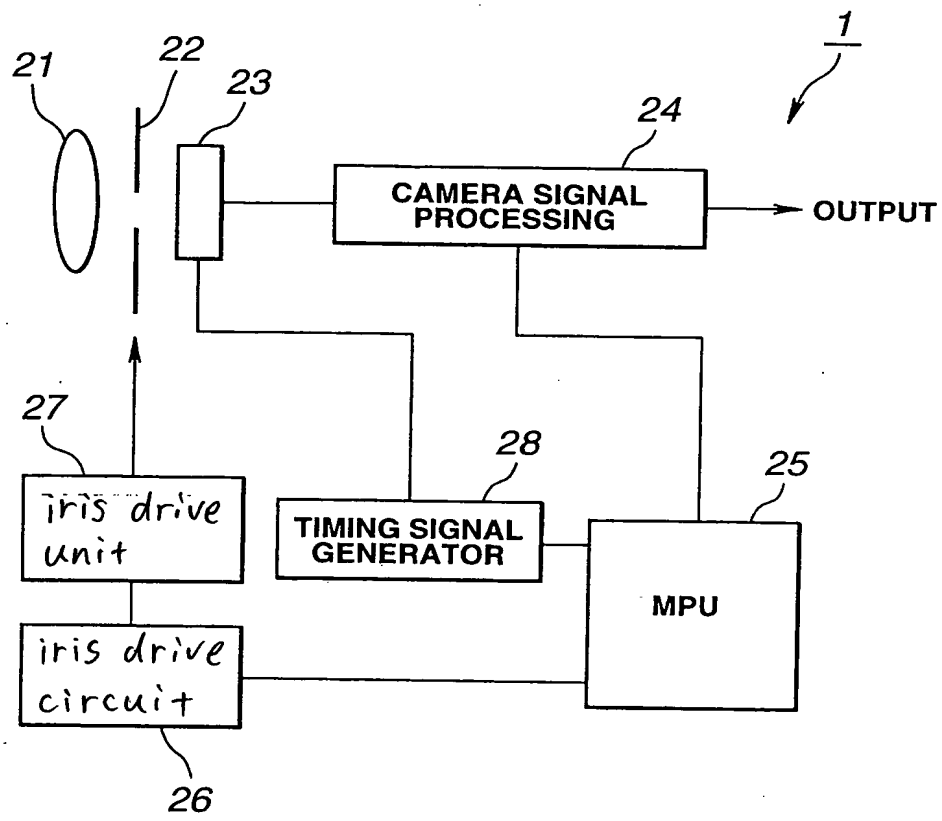
[Selected Drawing] FIG. 2

[DOCUMENT NAME]

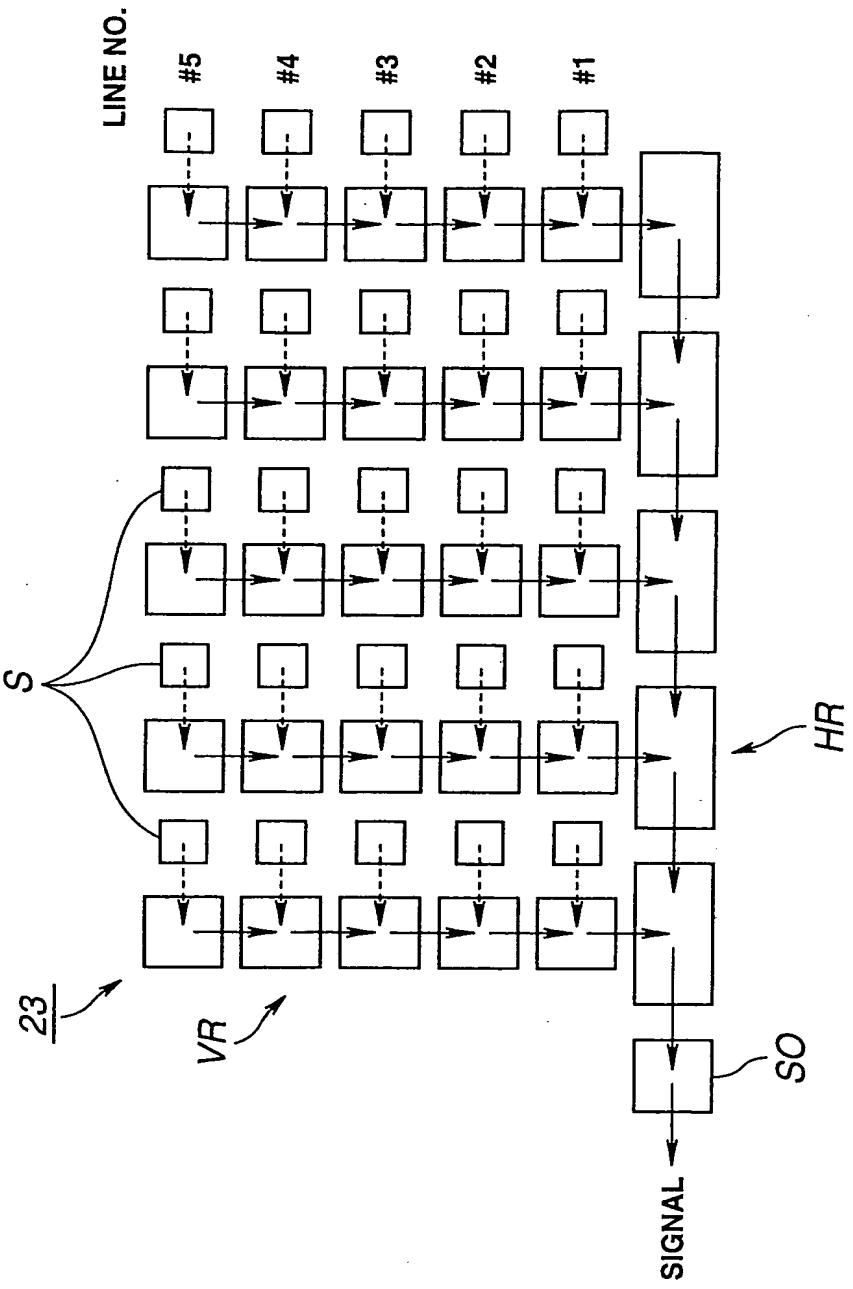
[FIG. 1]



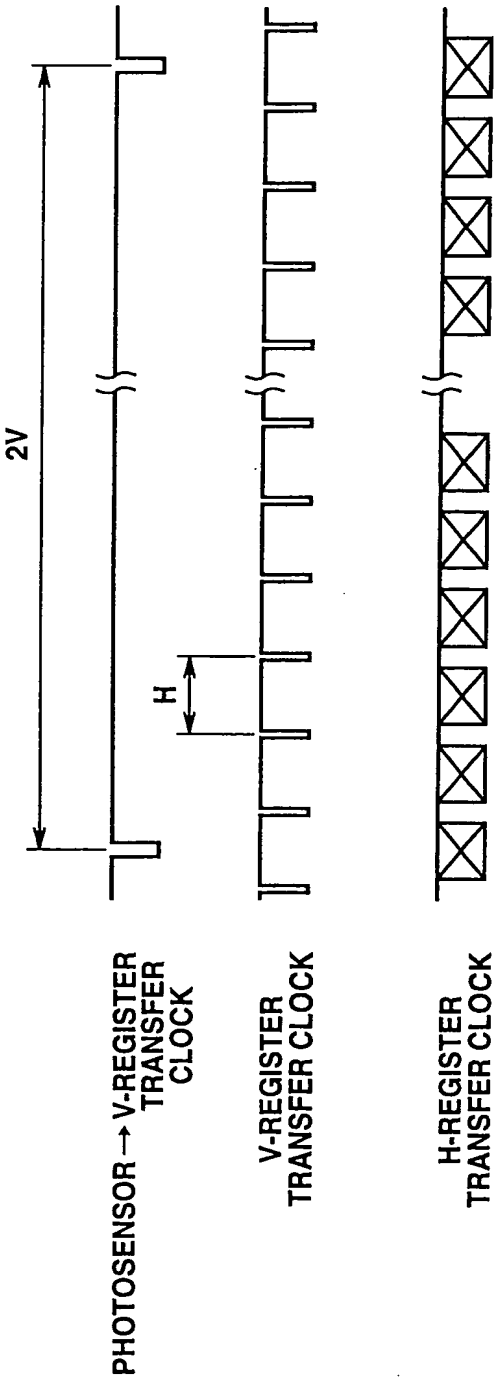
[FIG.2]


1
21
22
23
24
CAMERA SIGNAL PROCESSING
OUTPUT
27
28
25
iris drive unit
TIMING SIGNAL GENERATOR
MPU
iris drive circuit
26

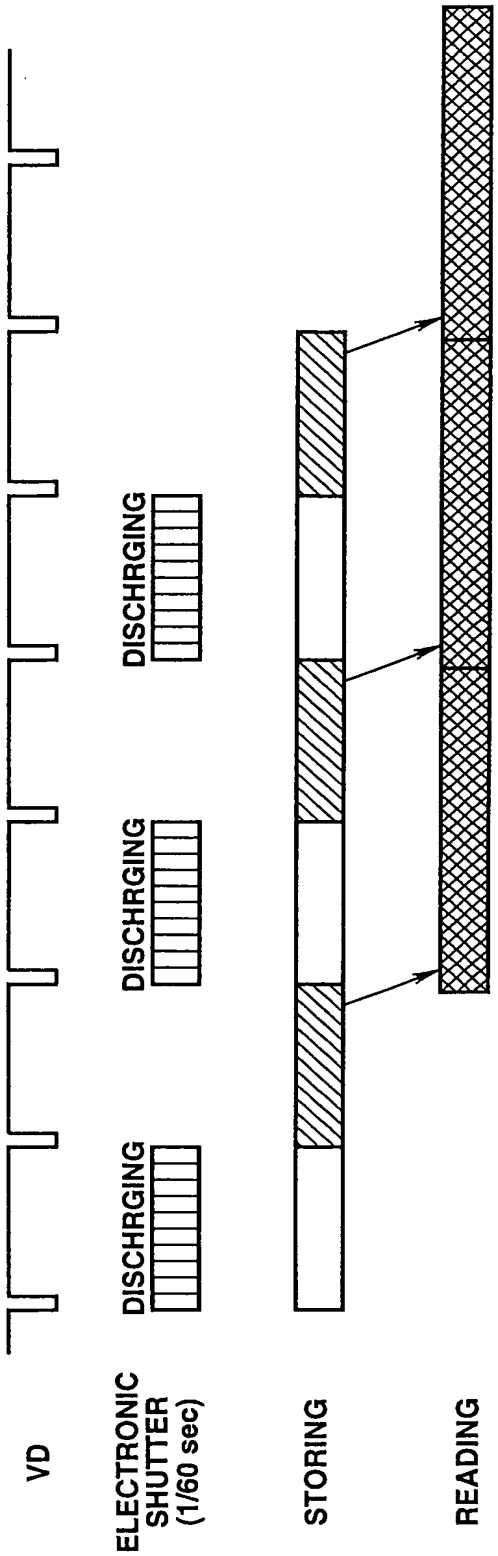
[FIG. 3]



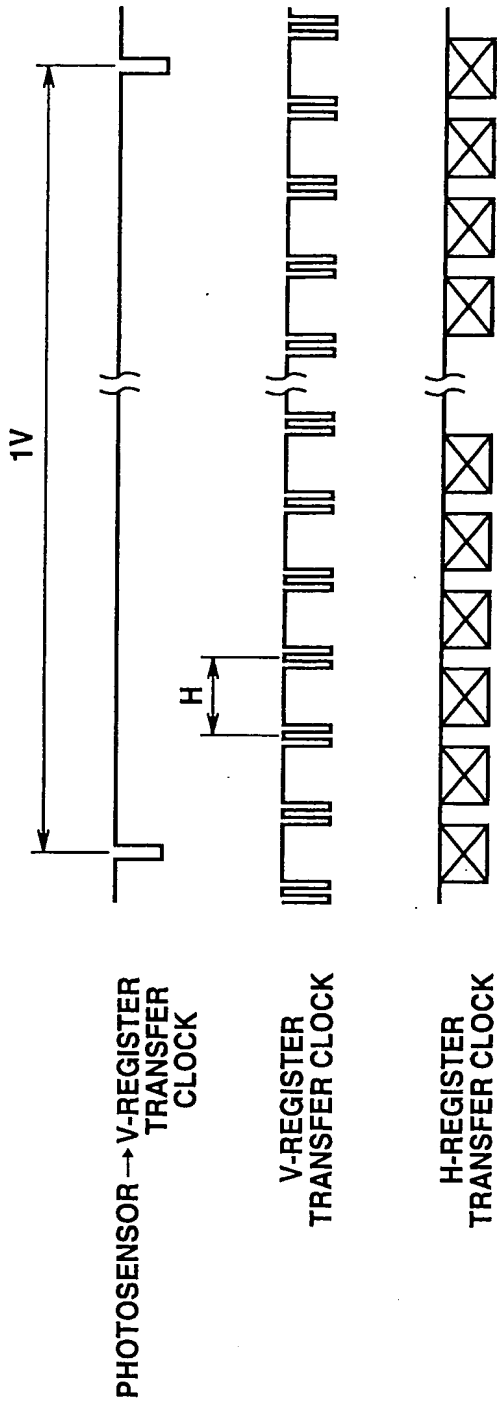
[FIG. 4]


2V
H
PHOTOSENSOR → V-REGISTER TRANSFER CLOCK
V-REGISTER TRANSFER CLOCK
H-REGISTER TRANSFER CLOCK

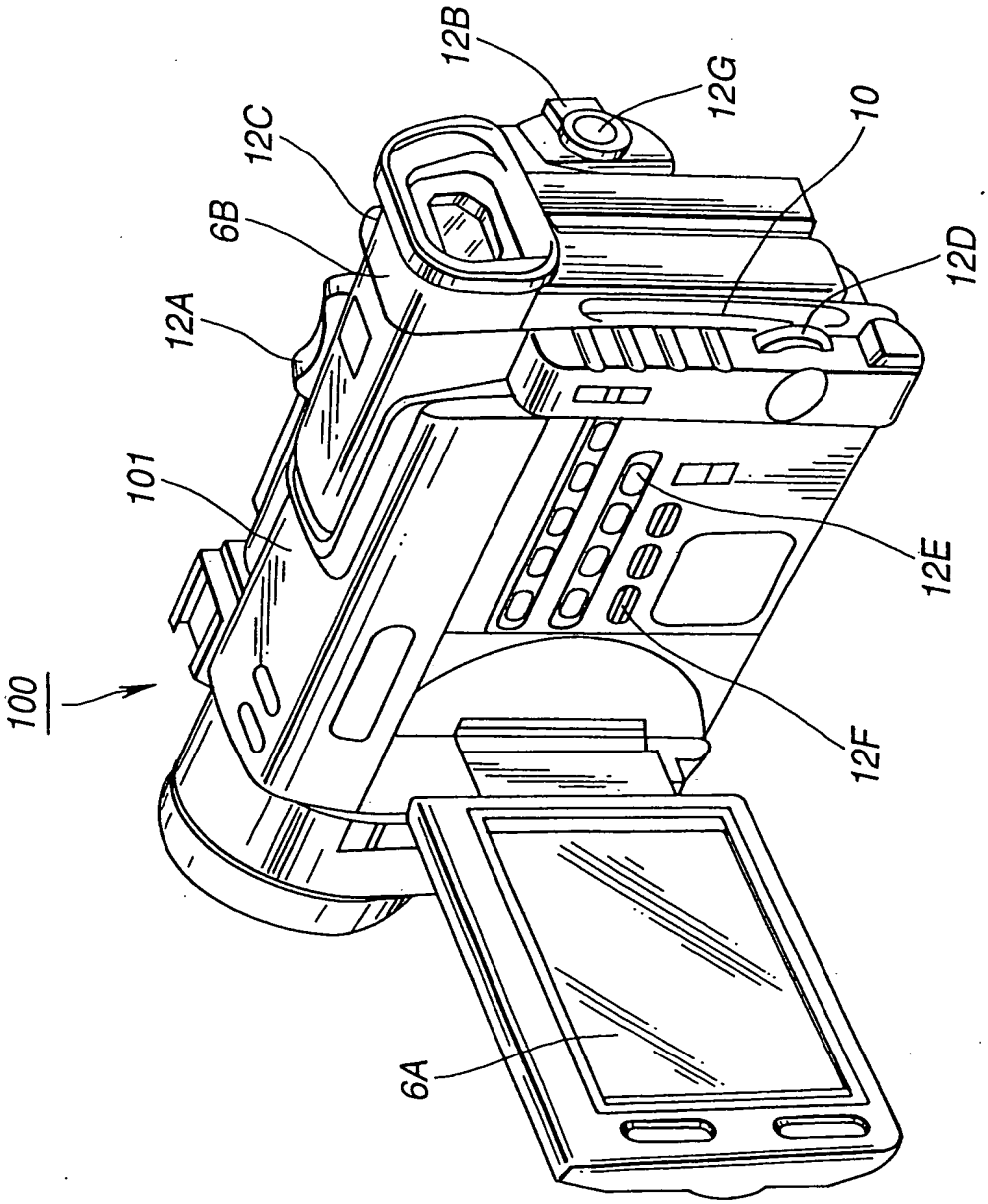
[FIG.5]


VD
ELECTRONIC SHUTTER (1/60 sec)
DISCHRGING
DISCHRGING
DISCHRGING
STORING
READING

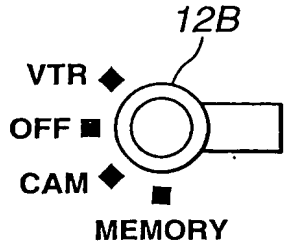
[FIG. 6]


1V
H
PHOTOSENSOR → V-REGISTER TRANSFER CLOCK
V-REGISTER TRANSFER CLOCK
H-REGISTER TRANSFER CLOCK

[FIG .7]



[FIG. 8]



[FIG. 9]

(A)

	MANUAL SETTING																	
M		PROGRAM AE																
C		PICTURE EFFECT																
		WHITE BALANCE																
		ND FILTER																
		AUTOMATIC SHUTTER																
		PROGRESSIVE																
		RETURN																
ETC																		
	END AT "MENU"																	

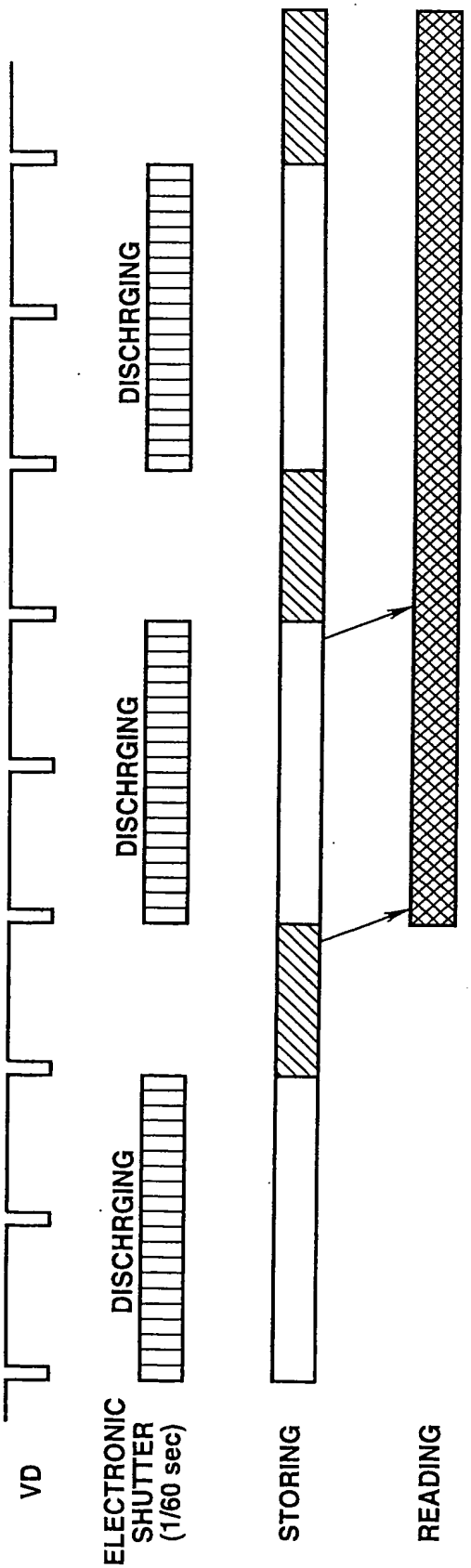
OFF

(B)

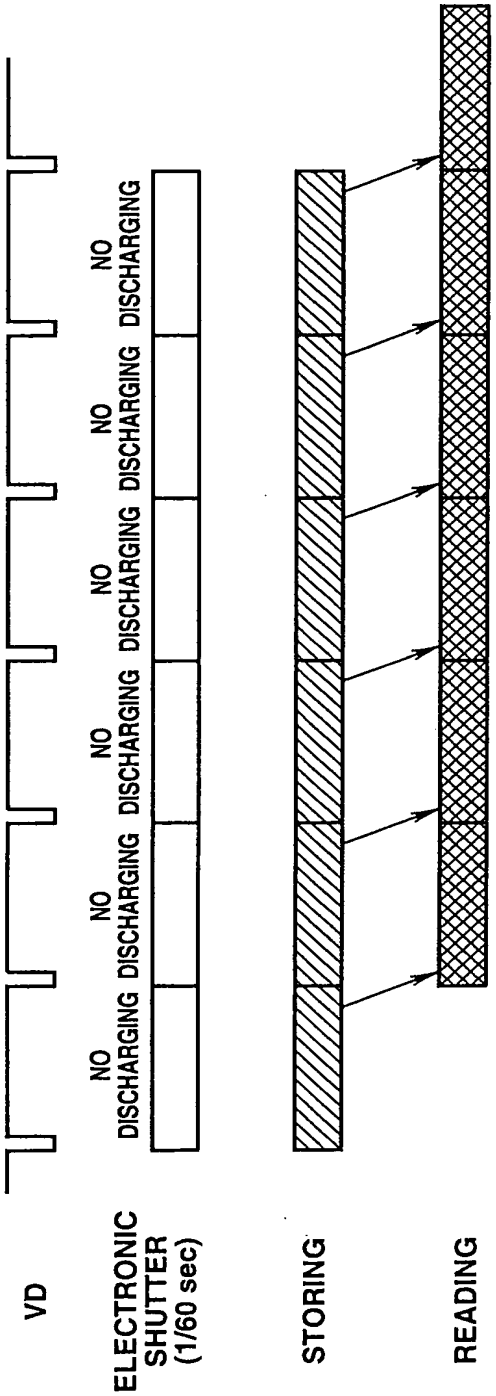
	MANUAL SETTING																	
M		PROGRAM AE																
C		PICTURE EFFECT																
		WHITE BALANCE																
		ND FILTER																
		AUTOMATIC SHUTTER																
		PROGRESSIVE																
		RETURN																
ETC																		
	END AT "MENU"																	

OFF
ON

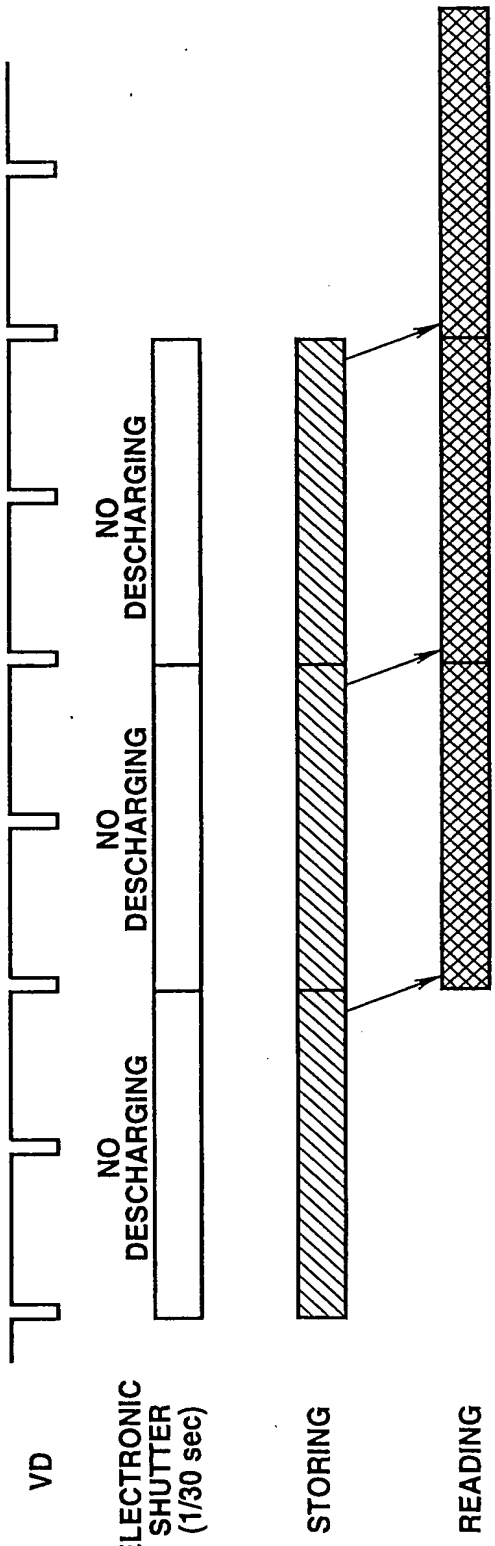
[FIG 10]


VD
ELECTRONIC SHUTTER (1/60 sec)
DISCHRGING
DISCHRGING
DISCHRGING
STORING
READING

[FIG.11]


VD
ELECTRONIC SHUTTER (1/60 sec)
NO DISCHARGING
NO DISCHARGING
NO DISCHARGING
NO DISCHARGING
NO DISCHARGING
STORING
READING

[FIG. 12]


VD
ELECTRONIC SHUTTER (1/30 sec)
NO DESCHARGING
NO DESCHARGING
NO DESCHARGING
STORING
READING